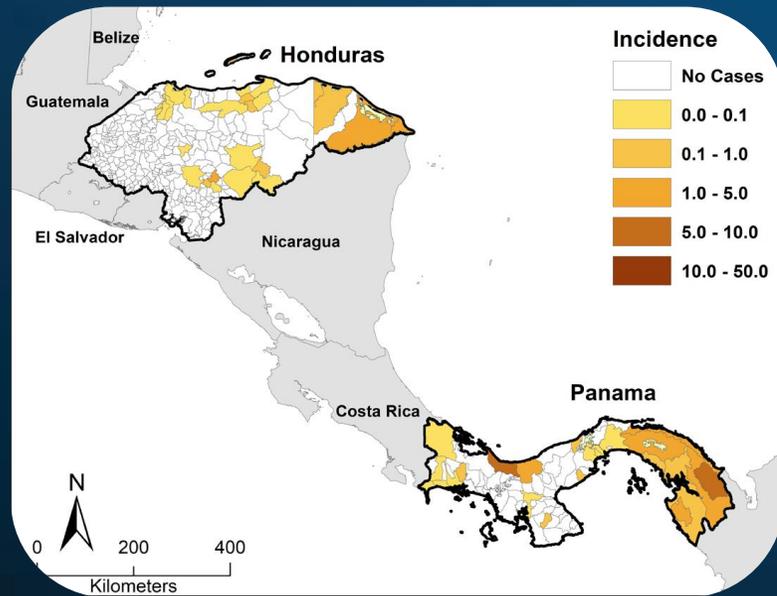


GETTING TO ZERO

SATELLITE-INFORMED SYSTEM TO SUPPORT ELIMINATION OF MALARIA IN THE AMERICAS (SISTEMA)



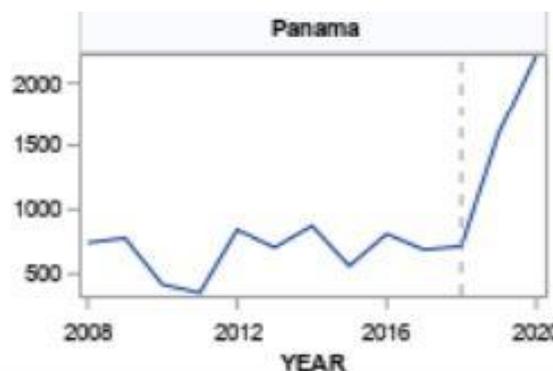
*NASA Health & Air
Qualities Program Review*

Sept 19 & 22, 2022

William Pan (PI)

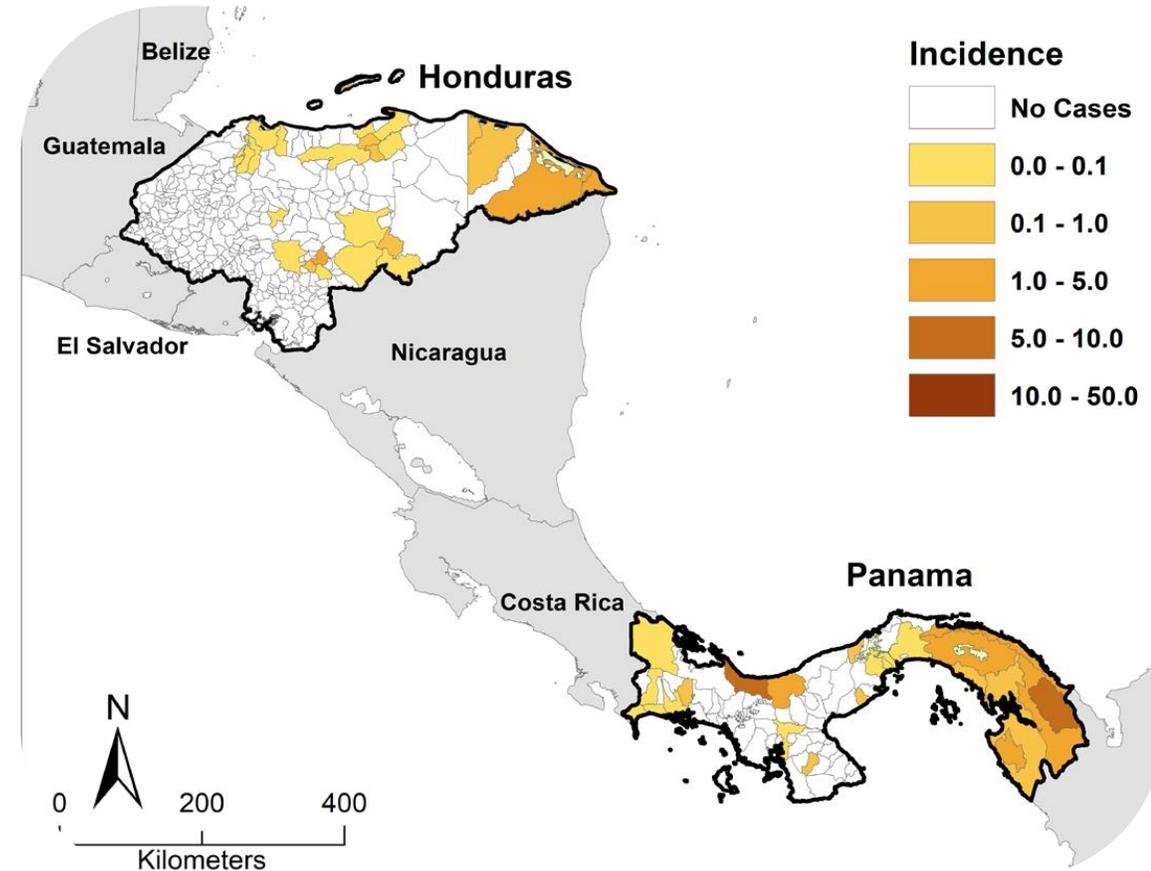
Project Motivation

- Malaria remains a major public health problem
- Progress toward malaria elimination has stalled
- Global and regional elimination efforts under-utilize environmental monitoring to improve identification of locations and time periods of elevated risk
- Regional Malaria Elimination Initiative (RMEI) – 9 countries of Central America & Caribbean

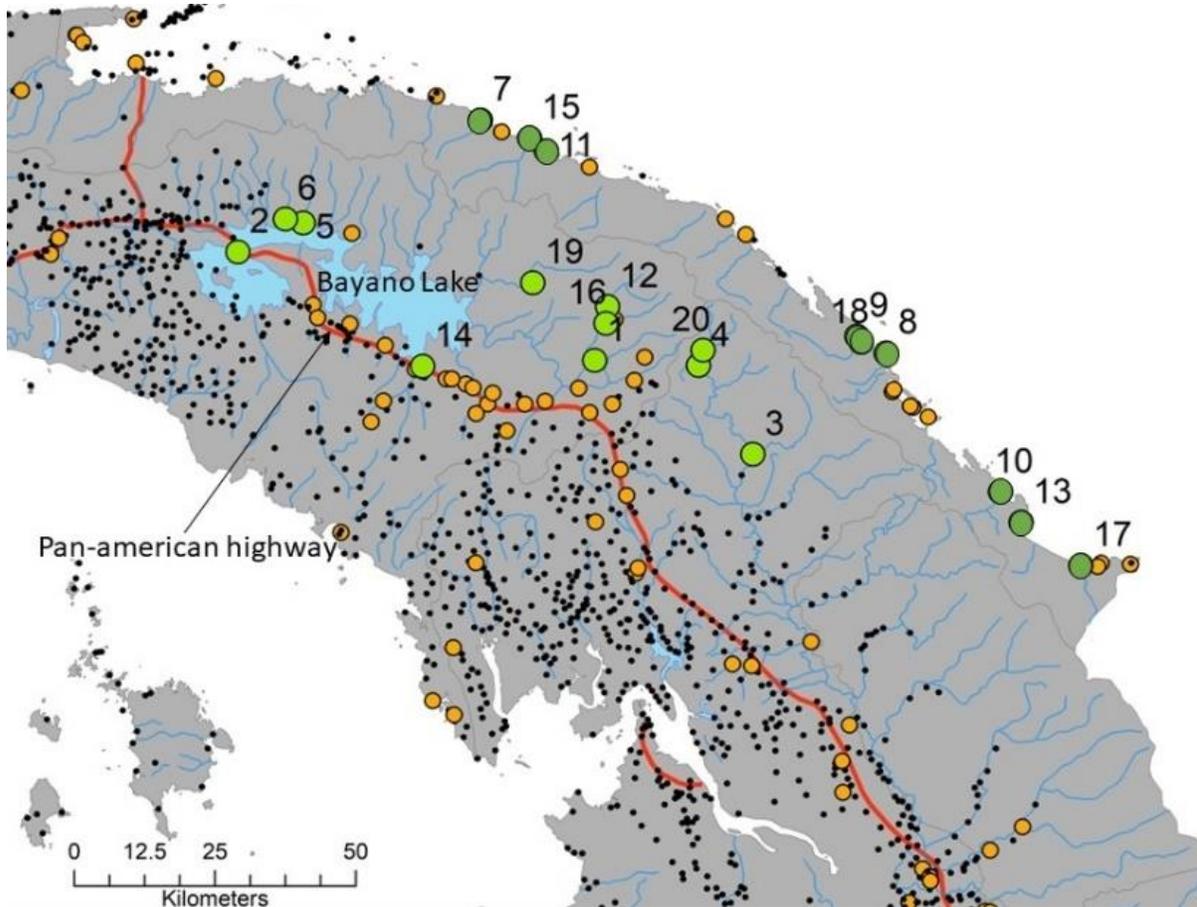


Panama Malaria Cases, 2008-2020

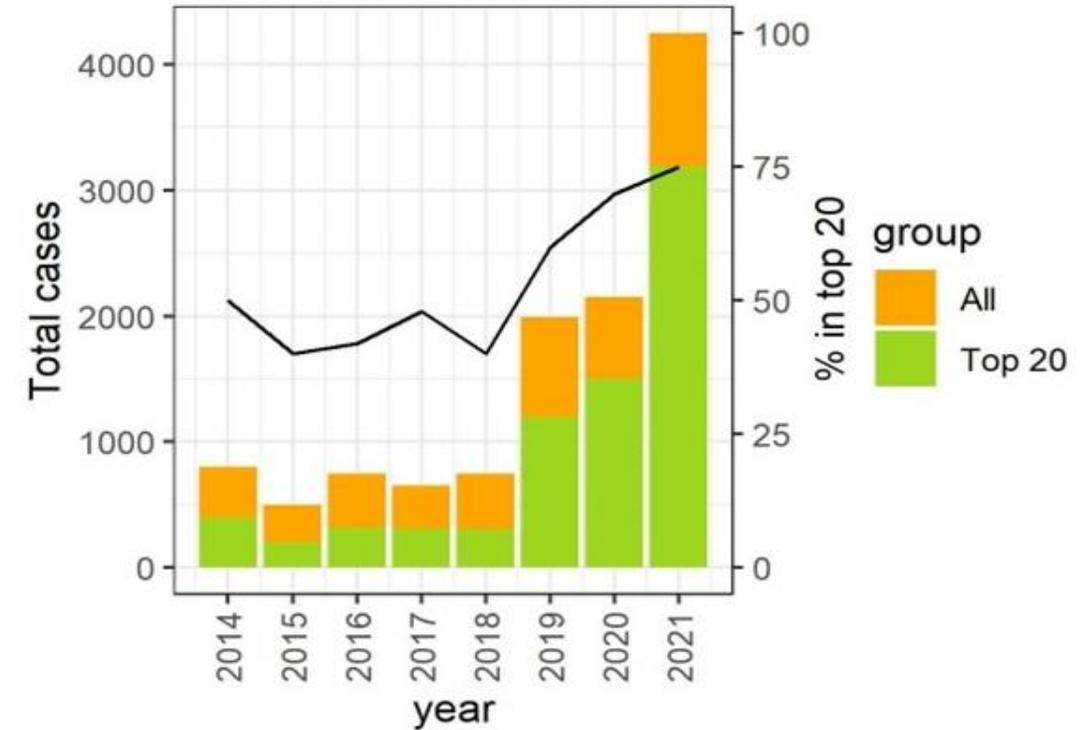
Vertical dotted line is when RMEI began



Project Motivation



Green dots--20 communities with highest transmission rates (**Non-indigenous**; **Indigenous**) from 2019-2021;
Orange communities where malaria transmission occurs.



**20 communities in Panama
comprise 75% of malaria cases**

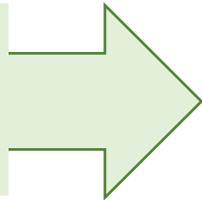
**Half are Indigenous
Communities**

Project Goals / Components

OVERALL GOAL

To **develop real-time, satellite-informed tools** to perform **early and enhanced detection of novel malaria** cases that improve the timing and spatial deployment of malaria interventions and speed progress toward malaria elimination in the Americas

**Environmental
Characterization
System (ECS)**



Hydrometeorology

-- LDAS @daily, 1km scale, S2S forecast

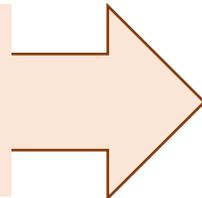
Pan-Tropical Climate Metrics

-- Modeling climate mode impact on malaria

Land cover analysis

-- Modeling vector/malaria ecology

**Malaria Elim.
Support Models
(MESM)**



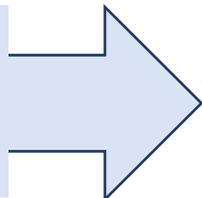
MESM-Vector Ecology

-- Use historical vector data for ecological risk modeling

MESM-Malaria Early Warning

-- 12-20 week malaria forecasts using ECS data

**Implementation
and Impact
Evaluation**



SISTEMA Dashboard with CHAI/MOH

-- Validate SISTEMA in decision-making env.

Evaluate tools in other RMEI countries

-- Potential testing in DR, Costa Rica, Belize

Milestones / Timeline and Current ARLs

Start date either May 13 or June 1



Year 1 Milestones

- Data transfer from CHAI / MOH
 - Malaria Cases, Intervention
 - Population at risk, Infrastructure
 - Local climate monitoring
- Mosquito vector database from INDICASAT
- Land cover data extraction, classification
- Initial Hydrology & PAN-Tropical Climate models

		Year 1			
		Q1	Q2	Q3	Q4
Data Acquisition: Surveillance, GIS, Vector, Intervention, EO Images, updates					
ECS: Development, Validation, Output	LDAS, Pan-Tropical, Land Cover Analysis		ARL5		
MESM: Development, Validation, Output	Vector Ecology and Early Warning models & maps		ARL4		
Capacity building & Dashboard development					
Presentation to IADB, BMGF, CSF					

Risks

Year 1 Milestones

- Data transfer from CHAI / MOH
 - Malaria Cases, Intervention
 - Population at risk, Infrastructure
 - Local climate monitoring
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Data Use Agreement with CHAI

CHAI has to manage expectations with MOH

- Only relates to malaria cases, not other data
- Minister & Vice-Minister of Panama & Honduras have both agreed to share data with team – we are only dealing with lawyers at Duke/CHAI now

Vector data published, but dataset lost!

- Working with Jose Loaiza to reconstruct (data publisher)

Cloud cover on many images

- Naiara & Pete will work together to adjust appropriately

Risks

Year 1 Milestones

- Data transfer from CHAI / MOH
 - Malaria Cases, Intervention
 - Population at risk, Infrastructure
 - Local climate monitoring
- Mosquito vector database from INDICASAT
- Land cover data extraction, classification
- Initial Hydrology & PAN-Tropical Climate models

Hiring data / project manager

- Salaries for quantitative expertise at masters level has increased 20-40% in 2 years!
- Demands to work remotely and not travel to sites
→ May hire Panamanian from CHAI to be Project manager rather than recruit new person at Duke

Biggest risk is methodological!

- can prior malaria forecast models provide improved decision-making at small scales?
- We view this a year 2 risk –i.e., what methods can we use to respond to potential forecast error?
→ We will have better idea next year on remediation of this expected problem



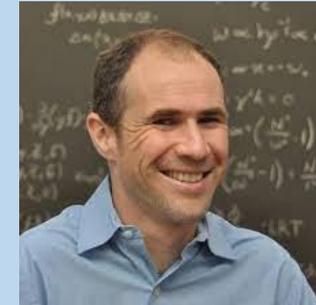
Mengxin Pan
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Prakrut Kansara
Johns Hopkins
University



Shineng Hu
Duke University



Ben Zaitchik
Johns Hopkins
University

Project Team

Climate Modeling & Forecasting



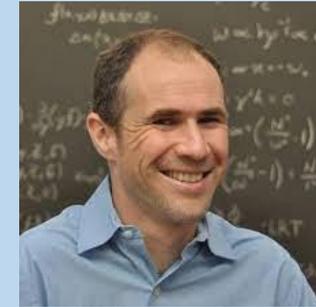
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Project Team

Land Use & Land Cover Analysis and Malaria Ecology



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NASA-JPL



Pete Harrell
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Paul Lantos
Duke University



Mark M. Janko
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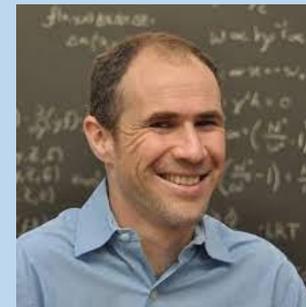
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Vector & Malaria Forecasting



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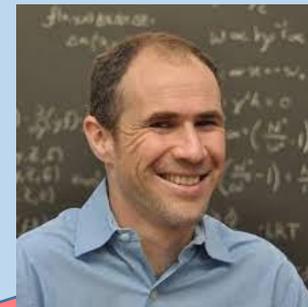
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Justin Lana
Clinton Health
Access Initiative



Carlos Gasco
CIAT

IMPLEMENTATION



Anna Stewart-Ibarra
Inter-American Institute
for Global Change



Paul Lantos
Duke University



Mark M. Janko
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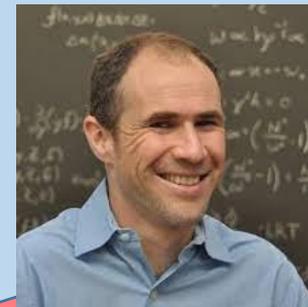
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GLOBAL HEALTH
INSTITUTE

THANK YOU

